

## PATENT SPECIFICATION

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DRAWINGS ATTACHED

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(19)



## (54) A WHEEL CHAIR THAT CAN BE USED ON STAIRS

(71) We, OY SUOMEN VANUTEHDAS—  
 FINNWAD LIMITED, a Finnish Company, of  
 Aleksanterinkatu, 48 A, 00100 Helsinki, 10,  
 Finland, do hereby declare the invention, for  
 which we pray that a patent may be granted  
 to us, and the method by which it is to be  
 performed, to be particularly described in and  
 by the following statement:—

The present invention relates to a wheel  
 chair that can be used on stairs, comprising  
 a body, a seat, rear wheels, and at least one  
 front wheel. Such a wheel chair is intended  
 mainly for invalids who can use their arms.

Previously, several wheel chairs are known  
 that are also intended for moving up or down  
 stairs. The disadvantages with these chairs  
 are usually large size and expense as well as  
 the circumstance that they are mainly intended  
 for electrical operation or at least for  
 operation on a certain type of stairs only.

The object of the present invention is to  
 eliminate, or at least reduce, this drawback  
 and to provide a wheel chair that is inexpensive  
 and by means of which the desired goal  
 can be achieved without a motor, caterpillar  
 belt or other complicated supplementary  
 appliances.

According to the invention there is provided  
 a wheel chair that can be used on stairs,  
 comprising a body, a seat, rear wheels, and at  
 least one front wheel, wherein each front  
 wheel is fastened to the body adjustably in  
 the vertical direction, and in that there are  
 provided handrail units fastened to the body  
 of the wheel chair and directed backwards  
 from the chair so as to support the chair  
 when the chair is inclined backwards to  
 enable the adjustment of the front wheels.

For a better understanding of the invention,  
 and to show how the same may be carried  
 into effect, reference will now be directed,  
 by way of example, to the accompanying  
 drawings, in which:—

Figure 1 is a schematic side view of a  
 wheel chair according to the invention in a  
 position partly inclined backwards,

Figure 2 shows the wheel chair of Figure  
 1 with the front wheels lowered down for  
 moving up or down stairs,

Figure 3 shows the wheel chair in a position

inclined fully backwards onto a pair of  
 handrails,

Figure 4 shows in detail on fastening  
 arrangement of the front wheel as a side  
 view,

Figure 5 is a front view of a wheel arrangement  
 of Figure 4,

Figure 6 shows a fastening arrangement of  
 a wheel chair front wheel that can be  
 adjusted in the running direction of the  
 chair,

Figure 7 shows another fastening arrangement  
 of a front wheel that can be adjusted  
 in the running direction of the wheel chair,  
 and

Figure 8 shows a small auxiliary wheel  
 fitted at the one end of a handrail.

A wheel chair is shown in Figures 1 to 3  
 and comprises a body 1, a seat 2, rear wheels  
 3, and front wheels 4. There may be only one  
 front wheel. These front wheels 4 are fastened  
 to the body 1 in a way known per se so that  
 they are vertically adjustable in relation to  
 the body 1. The wheel chair is further fitted  
 with handrails 5, 15 and 16 which are, in  
 their normal fastened position, approximately  
 horizontal and pointing backwards.

The handrails preferably consist of tube  
 components 5, 15 and 16 which can be telescopically  
 inserted into each other. In Figures  
 1 to 3 the handrails are in their pulled-out  
 position. They are preferably fastened by  
 means of joints 7 to the body 1 so that their  
 position can be changed easily. The end of  
 the outermost part 16 of the handrail is fitted  
 with a shoe 17 or with a small wheel 20  
 (Figure 8).

It may be seen from Figures 1 to 3 how  
 the wheel chair is used when going down  
 stairs. After the wheel chair has been, as  
 shown in Figure 3, tipped backwards manually,  
 with the handrails 5, 15, 16 pulled out, to  
 an inclined position, the front wheels 4 can  
 be lowered down to the position marked with  
 broken lines. After the front wheels 4 have  
 been adjusted and locked to the correct position,  
 the patient can, by means of a simple  
 movement of the hand or by leaning forward,  
 tip the wheel chair into the moving position  
 shown in Figure 1.

[Price 25n]

Figure 2 shows a situation in which the wheel chair is going down relatively wide stairs. It is easily understandable that the adjustment of the front wheels 4 in the vertical direction depends on the height of the step and on their width of tread. So, if the stairs were narrower than those in Figure 2, the front wheels 4 would at a certain stage come even to a level two steps lower than the rear wheels 5. In order to take this into account, the front wheels 4 ought to be adjusted still lower than that shown in Figure 3 by means of the broken lines. Since the user of the wheel chair, however, mostly has to move along the same stairs, he soon learns to choose the correct adjustment height for the front wheels 4. Another circumstance by means of which the width of steps can be taken into account is the adjustability of the front wheels in the running direction of the wheel chair. (By the intended direction of operative travel thereof), which can be performed in many different ways, as will be described later.

After descent of the stairs, the front wheels 4 are brought to their normal position by means of tipping the wheel chair onto its handrails 5, 15 and 16 in which position the front wheels 4 can easily be returned to their upper position (Figure 3). By moving his weight forward, the patient can restore the chair to the horizontal position.

In the example each front wheel 4 is, by means of a fork unit 11, fastened to the tube 6. The fork unit 11 is in such a way curved and mounted rotatably on the tube 6 so that the front wheel 4 can be in two different positions in the running direction of the wheel chair (Figure 4). The fork 11 may be either mounted directly rotatably by means of bearings to the tube 6 or it may be fitted with two fixed positions (position A for a wide tread, position B for a narrow tread). When the fixed positions are used, the front wheel 4 is fitted with a position locking device 12. The height adjustment of the front wheel 4 is in the example arranged so that the rod or tube 6 is telescopically arranged inside a wider tube 1 in the body. The tube 6 is formed, for example, with holes at uniform distances, into which holes the fastening knob 13, which is possibly fitted with a spring, can be fitted.

The embodiment according to Figure 6, besides vertical adjustment of the front wheels 4, also permits adjustment of their location in the running direction of the wheel chair either forwards or backwards. In this embodiment a tube 6 which is, for example, fitted with a height adjustment device described above, has been arranged so that it is pivotable about an axis perpendicular to the running direction of the wheel chair. The disc 14 has holes 19 for different angular positions of the tube 6. By means of a fastening screw 18, or equivalent, the tube 6 can be adjusted into the desired angular position. In this way the advantage is achieved that it is possible to move up or down stairs even though the width of tread were suddenly changed in the flight of stairs.

Disadvantages caused by minor alterations of step width can be eliminated or at least reduced by fitting the front wheels 4, in accordance with Figure 7, into brackets 9 in which the axle 8 of the front wheel 4 can move along a groove 10. This construction is provided with return springs located in the brackets 9, not shown in the drawing, so that the wheels 6 can perform their movements forwards and backwards and the springs automatically return them to their correct point after the wheels 6 are released. The springs can be helical, but are preferably gas springs.

By fitting the ends of the handrails 5, 15, 16 with small wheels 20 according to Figure 8 it is possible to go down even a steep hillside with the wheel chair.

The arrangement according to the invention is very simple, and it can also be provided as separate for most types of existing wheel chairs. The wheel chair according to the invention comprises elements known *per se*, namely, front wheels adjustable vertically and preferably also in the direction of running of the wheel chair, and the handrails. By combining these structural arrangements a very simple and practical wheel chair embodiment has been provided. It should be noted in particular that the way in which it is possible, by using the wheel chair according to the invention, to move along stairs would be impossible unless the handrails were used. Otherwise the user of the wheel chair could not safely lean the wheel chair backwards. On the other hand, with the aid of the handrails alone, it would not be possible to move along stairs in the intended way unless the front wheels were at least vertically adjustable.

**WHAT WE CLAIM IS:—**

1. A wheel chair that can be used on stairs, comprising a body, a seat, rear wheels, and at least one front wheel, wherein each front wheel is fastened to the body adjustably in the vertical direction, and in that there are provided handrail units fastened to the body of the wheel chair and directed backwards from the chair so as to support the chair when the chair is inclined backwards to enable the adjustment of the front wheels.
2. A wheel chair as claimed in Claim 1, wherein each front wheel is adjustable in the running direction of the wheel chair.
3. A wheel chair as claimed in Claim 1, wherein a telescopic arrangement for the vertical adjustment of each front wheel is provided.
4. A wheel chair as claimed in Claim 3, wherein the telescopic arrangement comprises

a first tube member being part of the body of the chair and a second tube member slidable within the first tube member and carrying the front wheel.

5. A wheel chair as claimed in Claim 4, wherein a wheel fork member projects from the lower end of the second tube member.

6. A wheel chair as claimed in Claim 2, wherein the mountings of the front wheels are pivotally mounted on the body of the chair for the adjustment of the distance between the front wheel and the rear wheel.

7. A wheel chair as claimed in Claim 1, wherein the length of the handrail units is adjustable.

8. A wheel chair as claimed in Claim 7, wherein the length of the handrail units is telescopically adjustable.

9. A wheel chair as claimed in Claim 1, wherein the outer end of each handrail unit is provided with an auxiliary wheel.

10. A wheel chair as claimed in Claim 5, wherein brackets in the fork are provided that include a substantially horizontal groove for the axle of the front wheel.

11. A wheel chair as claimed in Claim 10, wherein the brackets are provided with springs for returning the axle to its normal position along the groove.

12. A wheel chair as claimed in Claim 11, wherein the springs are gas springs.

13. A wheel chair that can be used on stairs, substantially as hereinbefore described, with reference to the accompanying drawings.

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COMPLETE SPECIFICATION

2 SHEETS

*This drawing is a reproduction of  
the Original on a reduced scale*  
Sheet 1

FIG. 1

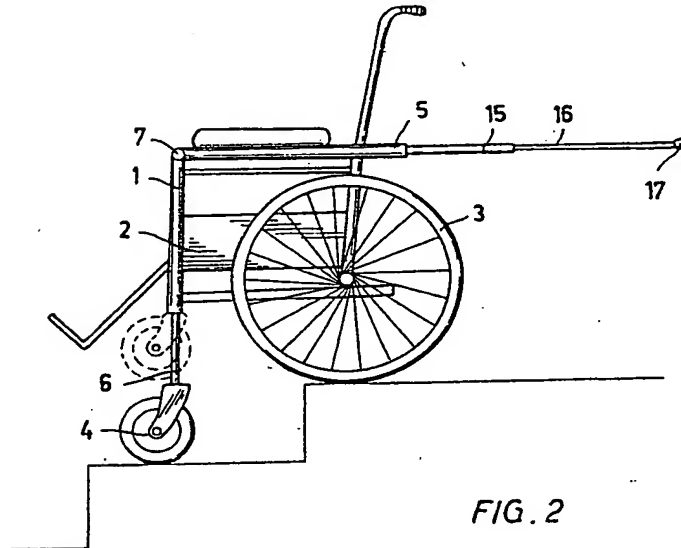
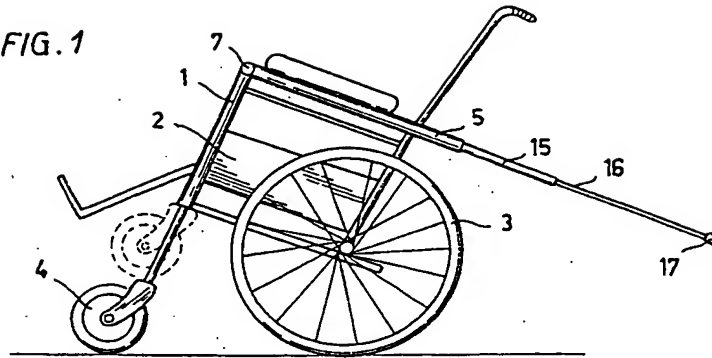


FIG. 2

